Graduate Student Handbook

Department Of Plant Pathology

University of California-Davis

(Prepared by R. L. Gilbertson, April 1996)
Welcome

Welcome to the Department of Plant Pathology at the University of California Davis. This handbook is designed to provide you with some basic information about the Plant Pathology Graduate Program to help you develop your program of study and research at UC Davis. General information regarding the University graduate program can be obtained from the Graduate Studies Office (room 252 Mrak Hall; phone: 752-0650). General graduate studies information can be accessed via the World Wide Web on the page: http://pubweb.ucdavis.edu/documents/gradstudies/homepage.html.

Graduate Advising

As a student, you will have two types of advisers:

A. Graduate Adviser-You are assigned a graduate adviser who is a faculty member of the department and is not your major (research) professor. This adviser is a member of the department Graduate Affairs committee and advises you on regulations of the Graduate Division and, along with the major professor, helps plan out a schedule of courses. The graduate adviser has formal responsibility for initiating faculty appointments to masters and Ph.D qualifying exams and thesis committees. Upon beginning your program you should contact your graduate adviser and schedule a meeting. You should check at the Main Office (rm 354) to determine who is your graduate adviser. You should meet with your graduate adviser twice per year; once in the Fall to plan your upcoming courses and once at the end of the academic year for your yearly evaluation.

B. Major Professor-This is the professor with whom you will carry out your research. This person may not also be your graduate adviser. This individual will help you identify a research topic and design and carry out the experimental work to answer the questions associated with this topic. This individual will be the chairperson of your thesis (masters or Ph.D.) committee.

Depending on your individual situation, you may already know your major professor before beginning your program. In some cases, students coming in on departmental research assistantships have up to a year to select a major professor. In these cases, you are encouraged to familiarize yourself with the faculty and their research interests and seek out a faculty person that you find has a research program compatible with your interests. You may want to contact a few such faculty members and see if you could work for short periods in their laboratories (rotations) to determine which is right for you. You are advised to carefully select your major professor as this is the faculty member with whom you will be most closely associated throughout your program and that will probably have a significant impact on your career!
Degree Requirements

I. General Information

a. Within the department, student admissions, fellowship and other financial aid decisions, and various other student affairs matters are handled by the Graduate Affairs Committee.

b. Incoming students must consult with their graduate adviser and major professor to determine if all undergraduate prerequisites have been fulfilled.

c. A student is not required to complete a master's degree (MS) before being admitted into the Ph.D. program. Students initially admitted into the MS program can petition to change to the Ph.D. program without completing the MS degree after satisfactory progress is demonstrated in courses and research. For students not completing the master's thesis, the change to the Ph.D. must be done within 9 quarters (3 years) and the qualifying exam scheduled within this time period (see information on qualifying exam). To change to the Ph.D. program, the student prepares a petition that is submitted by the graduate adviser before the Graduate Affairs Committee for consideration.

II. Academic requirements for the Master's Degree (M.S.) in Plant Pathology

There are two plans under which a student may obtain a master's degree, Plans I or II. For either plan, the student must fulfill the course requirements listed below.

Plan I. The student must complete at least a total of 30 units of upper division undergraduate and graduate courses (includes the plant pathology required courses; 12 units must be strictly graduate work) and submission of a master's thesis. A thesis committee of 3 faculty members (one of whom is the major professor) is responsible for guiding the student's thesis research and thesis preparation. This committee is recommended by the graduate adviser and must be formally appointed by the graduate dean.
Plan II. The student must complete at least 36 units of upper division undergraduate and graduate courses (18 units must be strictly graduate courses in the major subject and no more than 9 units of thesis research can be used to satisfy this requirement). No thesis is required, but the student must pass a comprehensive final examination that is administered by a committee of 3 faculty members (one of whom is the major professor). This committee must be nominated by the graduate adviser and appointed by the graduate dean.

Course requirements for the Master's degree

All students must take the three core courses*:

Plant Pathology 224 Pathogenic Fungi-----offered in Spring quarter even years

Plant Pathology 226 Plant Virology--------offered in Winter quarter odd years

Plant Pathology 228 Plant Bacteriology----offered in Fall quarter even years

*Nematology students can substitute one of these courses for Nematology 225 or two of the 2-unit graduate courses in Nematology

and one of the two field courses:

Plant Pathology 205-Diseases of Field and Vegetable Crops----offered in Spring quarter even years

Plant Pathology 206-Diseases of Fruit, Nut, and Vine Crops----offered in Spring quarter odd years

Additional requirements for the Master's Degree

a. Participation in department seminars

All students must enroll in the departmental general seminar (290) each quarter they are enrolled. In addition, students must enroll in at least one of the other special seminars (e.g. PLP 291, 292, 293, etc.) that are offered per year. These special seminars vary in topic and availability; instructors will post flyers around the department indicating when special seminars are offered and their subject matter. Alternatively, this information can be found in the Class Schedule and Room directory that is issued before the start of each quarter.

b. Teaching
There is no formal teaching requirement for students pursuing a master's degree. However, master's students are encouraged to consider taking the opportunity to be a teaching assistant if possible.

c. On-campus residence* requirement and time to complete the degree

Students working toward a master's degree must be registered and on campus for at least 3 quarters. The targetted time frame for the completion of the master's degree is 6 quarters (2 years).

*Note: The university defines 'in residence' as being students who are registered in regular university courses for at least four units of upper division or graduate courses in a quarter, or for at least two units of such work in two sessions of Summer Session.

III. Academic requirements for the Doctor of Philosophy Degrees (Ph.D.) in Plant Pathology

a. All students must take the three core courses*:

Plant Pathology 224 Pathogenic Fungi------offered in Spring quarter even years

Plant Pathology 226 Plant Virology---------offered in Winter quarter odd years-has been proposed for every year

Plant Pathology 228 Plant Bacteriology----offered in Fall quarter even years

**Nematology students can substitute one of these courses for Nematology 225 or two of the 2-unit graduate courses in Nematology

and one of the two field courses*:
Plant Pathology 205-Diseases of Field and Vegetable Crops—offered in Spring quarter even years

Plant Pathology 206-Diseases of Fruit, Nut, and Vine Crops—offered in Spring quarter odd years

*All students are required to take either PLP 205 or 206. Whichever course is selected can not also be toward the specialty course requirement.

**b. All students must select a specialty area**

Based on your academic interests you will choose a specialty area and you must take at least three courses within this area and one course from another specialty area.

(Note: There is no formal university unit requirement for the Ph.D. degree.)

**Specialty areas**

(see list of suggested courses for specialty areas at the back of this handbook)

1. **Etiology and management of plant diseases.**

   Emphasis on diseases of vegetable, fruit and nut trees, field crops, and ornamental plants; postharvest diseases of fruits and vegetables; and chemical, biological, and other approaches to disease management.

2. **Ecology and epidemiology.**

   Interactions of host plant, environment, and pathogen in the development of plant diseases, quantitative and qualitative attributes of plant disease epidemics, pathogen dispersal, and ecology.

3. **Biology and molecular biology of plant pathogens and host-pathogen interactions.**

   Genetics, taxonomy, and molecular biology of plant pathogens; physiology, biochemistry, and molecular biology of host-pathogen interactions, molecular basis of plant susceptibility and resistance.

4. **Nematology.**

   Identification and taxonomy, ecology and epidemiology, molecular biology, and management of plant diseases caused by nematodes.
Additional Ph.D. Requirements

a. Participation in department seminars is a requirement

All students must enroll in the departmental general seminar (290) each quarter they are enrolled. In addition, students must enroll in at least one of the other special seminars (e.g. 291, 292, 293, etc. that are offered per year. These special seminars vary in topic and availability; instructors will post flyers around the department indicating when special seminars are offered and their subject matter. Alternatively, this information can be found in the Class Schedule and Room Directory that is issued before the start of each quarter.

b. Qualifying (preliminary) exam.

i. Goal of the qualifying exam. All prospective Ph.D. students are required to take a qualifying (or preliminary) exam that serves as an indication of whether the student possesses a certain level of knowledge appropriate to proceed with the Ph.D. program.

ii. When must the qualifying exam be taken? Students must take the qualifying exam at or before the completion of nine quarters (3 years) as a registered student in the Plant Pathology Department. Students admitted into the Plant Pathology Department for a master's degree and who are changing to a Ph.D. without completing a master's thesis remain subject to the 9 quarter rule. Students who completed a master's degree start over and have a new 9 quarter requirement before having to take the qualifying exam. Students must be registered for the quarter in which they want to take the exam and have a "B" average in all work undertaken in graduate standing. If a student has any questions concerning the scheduling of their preliminary exam, they should contact their graduate adviser.

iii. What is the format of the qualifying exam? The exam is taken before a committee of five faculty members (one should be from outside of the department). Usually, the student, with the input of the major professor, selects five potential exam members and presents these selections to the Graduate Affairs Committee, which approves the selections or recommends certain changes. The Graduate Affairs Committee forwards the choices to Graduate Studies, and the Executive Associate Dean of Graduate Studies makes the formal appointment of the committee. The committee may give an oral or written exam, although oral exams are most common.

iv. What is the content of the qualifying exam? All students are presumed to possess a strong basic knowledge and understanding of plant pathology. The depth with
which this understanding will be examined will reflect, to some extent, the area of emphasis of the student's research (i.e. the specialty area that the student has selected).

In addition, **three specific areas will be defended**. These areas are usually selected by the student in consultation with the academic and/or major adviser. These areas are listed below. Student may propose alternative specific areas, but these must be approved by the Graduate Affairs Committee.

In the qualifying exam, **students should expect to defend their thesis research in detail**. Students should prepare a short (3-5 pages) summary of their thesis research proposal that should be given to the members of the qualifying examination committee 1-2 weeks before the examination date.

**Areas for Defense in the Preliminary Examination**

1. General Plant Pathology
2. Bacteriology
3. Mycology/Plant Pathogenic Fungi
4. Virology
5. Host-Pathogen Interaction
6. Epidemiology
7. Soil Microbiology
8. Molecular Biology
9. Genetics
10. Biochemistry/Physiology of Plant Disease
11. Plant Pathogen/Insect Interactions
12. Ecology

c. **Teaching**

Each student is required to be a teaching assistant (TA) for at least one quarter. Students can approach instructors directly regarding the possibility of being a TA for a specific course, but the final decision rests with the Department Curriculum Committee. The department reserves the right to have a student TA for more than one quarter depending on the circumstances. Students may choose to be a TA in Introduction to Plant Pathology (PLP 120) as a refresher before taking the qualifying exam. Students also can be TAs in courses outside of the Plant Pathology Department; however, they should consult their major professor and graduate adviser before accepting such a position.

d. **Advancement to Candidacy and Appointment of a Dissertation Committee**.

During the course of the student's research, the student should begin to think about the composition of the dissertation committee, which consists of three faculty members one of which is the major professor. Approved faculty members from outside the department may be members of the dissertation committee. Once the student has passed the qualifying exam, the student meets with the major professor to formally
designate a dissertation committee. In practice, the student is encouraged to select this committee well before this time. The dissertation committee must be approved by the Executive Associate Dean of Graduate Studies. Students are encouraged to meet with their dissertation committee on a regular basis.

e. Dissertation

Each student must submit a dissertation that meets the approval of all members of the dissertation committee. The research that is the subject of this dissertation is initiated with the input of the major professor and is conducted under the guidance of this individual and the dissertation committee. As soon as a dissertation committee has been selected, the student should meet with the committee to obtain further guidance concerning the direction and content of the student’s thesis research. During the course of a student’s Ph.D. research, the student can request a committee meeting at any time. The final dissertation must be approved by the dissertation committee and Graduate Studies before the Ph.D. is conferred. There is generally no final or dissertation defense, although the committee may choose to ask the student to defend the dissertation research before the committee. Detailed instructions regarding the form of the dissertation can be obtained from Graduate Studies (252 Mrak Hall).

f. Exit seminar.

All students are expected to present to the department a seminar on their dissertation research.

g. On-campus residence requirement and time to complete the degree

Students working toward a Ph.D. must be registered and in university residence for a minimum of six regular quarters. Two consecutive regular Summer Sessions can be substituted for one regular quarter if two units are taken in each Summer Session. The normative time to complete a Ph.D. ranges from 4-6 years and is measured from the time a student begins graduate study at UC Davis. Up to three quarters of non-registered status is allowed.

IV. Other activities/information

1. Financial Aid

Financial aid is available in the form of fellowships and various other programs. The deadline for applications for UC Davis fellowships is January 15. Students can obtain information about financial aid from the graduate adviser, the Office of Graduate
Studies, and from other sources. Students should be aware that the criteria for different awards varies.

2. Graduate Student Associations

Students may elect to participate in the university Graduate Student Association (GSA), Department of Plant Pathology Students (DOPPS) organization, and in other departmental or campus committees. The DOPPS sponsors an annual Fall Picnic to introduce new students to students, faculty, and staff.

GSA and DOPPS positions are determined through election. Membership on most other committees is on a volunteer basis. Most departmental committees have at least one graduate student member. Faculty meetings are open to one representative of DOPPS.

3. Participation in the Plant Disease Clinic

The Plant Disease Clinic is run by the DOPPS organization and is responsible for the diagnosis of samples submitted by homeowners. Samples submitted by growers or farm advisers are the responsibility of the extension specialists.

4. Desk assignments

Students will be assigned a desk in the graduate student room (grad file) or elsewhere; new students should contact the Vice President of DOPPS for a desk assignment.

5. Computer Room

A computer room is available to plant pathology graduate students with both MacIntosh and PC computers. Electronic mail addresses are available through the university computing center.
V. Some general comments on UC Davis, courses, etc:

1. UC Davis is divided into three colleges: i) Agriculture and Environmental Sciences (AES); ii) Engineering; and iii) Letters and Science (L&S)

   The Department of Plant Pathology is in AES

2. Graduate programs are administered under the Office of Graduate Studies (room 252 Mrak Hall). This office is headed by the Dean of Graduate Studies. A Graduate Council composed of faculty members, the graduate dean, and representatives of the Academic Staff Organization and the Graduate Student Association is concerned with Graduate Student matters, unusual student petitions, and other actions.

3. Undergraduate courses are numbered: 1-99 (lower division) 100-199 (upper division)

   Graduate courses are numbered: 200-299

4. The Division of Biological Sciences is an intercollege unit (between AES and L&S). It is composed of five sections that were once separate departments: i) Evolution and Ecology; ii) Microbiology; iii) Neurobiology, Physiology and Behavior; iv) Molecular and Cellular Biology; and v) Plant Biology. Courses in these sections are all listed under biological sciences in the course catalog.

5. The plant science major has been eliminated because of redundancy with Plant Biology. Plant Biology (PLB) is now an intercollege program (AES and L&S) that eventually will include renumbered plant science (PLS) courses. For now, Plant Science course retain their PLS designators but they will soon be renumbered as PLB courses. Another major: Agricultural Systems and the Environment (ASE) was recently created that also includes plant science-type courses. There is a proposal to establish a crop science major that would include many plant science courses.

6. The Departments of Plant Pathology and Nematology are separate departments that share an administrative unit. Plant pathology students who select the nematology specialty area have plant nematology as their primary interest, but also a strong interest in plant pathology. These students usually have a nematology faculty member as their major professor, but receive a degree in plant pathology. Upon consultation with their graduate adviser, they may choose to substitute a nematology course for one of the three core courses required for plant pathology students.

7. Talk to your fellow students about their experiences with courses and other aspects of the graduate program; they are an invaluable resource.
VI. Representative Course Lists for Specialty Areas

The courses listed below have been compiled based on faculty and student input; they do not represent all the courses that might be of interest or which can qualify as specialty area courses. To determine if other courses may be suitable, consult with your graduate adviser to confirm that a course will fulfill a requirement. Students are encouraged to browse through the course catalog (put out on a yearly basis), and discuss potential courses with their major professor, graduate adviser, and student colleagues.

To find out if alternate year courses are being offered, consult the Class Schedule and Room Directory for the appropriate quarter (available at bookstore for a nominal fee). Alternatively, the department can be contacted directly to obtain additional information.

(Department/Course number and title / Instructor / When offered / Comments)

Etiology and control of plant diseases specialty area

Plant Pathology

PLP 125 Diagnosis and Control of Plant Diseases. MacDonald. Spring-odd years.
Should be taken by those who have limited background in Plant Pathology and/or who need a course in disease diagnosis. Two labs/week-requires a fair amount of work

PLP 205A-B Diseases of Vegetable and Field Crops. van Bruggen. Spring-even years.
Should be taken by those interested in vegetables and vegetable crop production; field trips, including one during the summer

Should be taken by those interested in fruit, nut, and vine crops and their production; field trips, including one during the summer

PLP 209 Principles of Disease Control. Webster. Winter-even years.
Should be taken by those interested in concepts of disease control

Plant Protection and Pest Management

For those interested in an integrated approach to pest management (IPM) and the role of IPM in agricultural systems

- Emphasis on identifying plant diseases and insect pests; assessment of losses caused by diseases and pests; establishing economic thresholds; for those interested in IPM

**Viticulture**

**VIT 118** Grapevine Pests, Diseases and Disorders. Williams. Fall-odd years.
- Emphasis on grape pests and pest management; for those with specific interest in grapes

**Ecology and epidemiology of plant diseases specialty area**

**Plant Pathology**

**PLP 208** Ecology of Plant Pathogens and Epidemiology of Plant Diseases. Duniway.
- Spring-odd years.
- Interactions between plants, pathogens and the environment as they relate to disease development

**Agronomy**

**AGR 205A** Experimental design, Analysis, and Interpretation. Geng. Winter.
- Emphasis on planning and analysis of field and laboratory experiments; especially recommended for those carrying out field projects

- Multiple regression, multivariate and computer modeling and their role in analysis of research experiments. Formerly course 205B.

Other statistics courses:

**Statistics**

**STA 106** Analysis of Variance (Fall, Winter)
**STA 108** Regression Analysis (Fall, Winter, Spring)
**STA 110** Multivariate Analysis (Spring)
**STA 137** Applied Time Series Analysis (Spring)

**Agricultural Systems and the Environment**

**ASM 121** Systems Analysis in Agriculture and Resource Management. Plant. Fall.
- Systems analysis for management of agricultural and environmental systems; recommended for those interested in modeling

**Ecology**
-Analytical models of predator-prey and host-parasite relationships


Microbiology (under Biological Sciences)

-Interactions between non-pathogenic microbes and the environment

MIC 120L Microbial Ecology Laboratory. Meeks. Spring.
-Study of prokaryotes from various habitats; 6 hour laboratory.

Others:
PLS 110 Rhizosphere Ecology (Spring)

Applied Biological Systems Technology
ABT 180 Introduction to Geographic Information Systems (Winter)
ABT 181 Geographic Information Systems Modeling (Spring)

Hydrologic Science
HYD 273 Introduction to Geostatistics (Fall-even years)

Atmospheric Sciences

ATM 133 Biometeorology. Paw U. Winter.
-Physical and biological basis for water vapor, CO2, and energy exchanges with the atmosphere; involves plants and animals; microclimate of plant canopies

ATM 233 Advanced Biometeorology. Paw U. Winter-even years.
-Modeling and measuring transport from plant canopies, surface temperature, aerobiology, etc.

Soil Sciences

SSC 111 Soil Microbiology. Scow. Winter.
-Major groups of microbes in soil, interrelationships with plants, response to the environment; includes a 3 hr lab.

SSC 107 Soil Physics. Rolston, Hopmans. Fall.
-Soil physical properties; water, gas, heat and solute movement-related to soil and water management; includes a 3 hr lab
SSC 208 Soil-Plant Interrelationships. Richards. Winter-odd years.
-Plant needs-water, minerals, etc; root growth; nutrient assimilation;

Others:
SSC 209   Physiology and Ecology of Mycorrhizal Symbioses (Fall)
SSC 211   Advanced Soil Microbiology (Spring-even years)
SSC 219   Ecosystem Biogeography (Spring)
Physiology, biochemistry, and molecular biology of plant pathogens and host pathogen interaction specialty area

Plant Pathology

PLP 130 Fungal Biochemistry and Biotechnology. Gilchrist/Bostock. Fall-odd years.

PLP 210 Biochemistry and Molecular Biology of Plant-Microbe Interactions. Gilchrist/Bostock. Fall-even years.

PLP 215X Genetics and Molecular Biology of Plant Pathogens. Tyler. Winter-even years.
-3 hour laboratory/discussion

PLP 217 Molecular Genetics of Fungi. Tyler/Holland. Winter-odd years.
-Advanced course for those interested in fungal molecular biology

Microbiology (listed under Biological Sciences)

MIC 162 General Virology. Manning. Fall.
-Introduction to structure, replication, and genetics of animal, plant, and bacterial viruses; for those with less background in virology and molecular biology; those with more background may take MIC 262

MIC 215 Recombinant DNA. Privalsky. Fall.
-Excellent introductory course for those interested in the experimental basis of molecular biology

-Advanced treatment of structure, gene expression and function, and host interactions of animal, plant and bacterial viruses

Others:
MIC 263 Principles of Protein-Nucleic Acid Interactions (Spring-odd years)

Molecular Biology

MCB 221C Molecular Biology. Dahmus. Spring.
-Advanced treatment of structure and organization of DNA; DNA replication, transcription, translation in eukaryotes, prokaryotes and viruses

MCB 262 Recombinant DNA and Genetic Engineering. Rodriguez. Winter-even years.
- Emphasis on moveable genetic elements and their roles in genetic engineering; fairly specialized; molecular biology background needed

Others:

MCB 121 Molecular Biology of Eukaryotic Cells (Winter)
MCB 122 Structure and Function of Proteins (Fall)
MCB 126 Plant Biochemistry (Spring)
MCB 141 Cellular Regulation of Gene Expression (Spring-odd years)
MCB 164 Advanced Eukaryotic Genetics (Fall)

Plant Biology

PBI 227 Plant Molecular Biology. Harada/Britt. Fall
- Advanced treatment of plant molecular biology; emphasis on gene expression; students should have previous molecular biology background

PBI 218B Signal Transduction. Lucas/Lagarias. Spring-odd years.
- How plants cells communicate; includes how pathogens/plants interact; should have molecular biology background

Plant Science* (see general comment)

- Excellent overview of biotechnology of plants including recombinant DNA technology, plant molecular biology, and cell and tissue culture. Minimal molecular biology background required

Others:

PLS 105 Plant Genetics (Fall)
PLS 107 Plant Cell, Tissue, and Organ Culture (Winter)
PLS 113 Plant Breeding (Fall)
PLS 145 Applied Plant Biology Winter

Vegetable Crops

- Integration of classical plant breeding and modern concepts of biotechnology; strong emphasis in breeding, gene mapping, gene identification, plant transformation; considers disease resistance. Molecular biology background recommended.

VCR 225 Transposable Elements in Higher Plants. Yoder. Winter-odd years.
- Classical and molecular aspects of transposable elements in plants
Nematology specialty area

Nematology

NEM 100 General Plant Nematology. Ferris. Fall.
-Introduction to classification, morphology, biology, and management of plant parasitic nematodes; 6 hours of laboratory work.

-Classification, morphology, ecology, distribution, and importance of animal- and plant-parasitic nematodes

NEM 201 Molecular and Physiological Plant Nematology. Williamson. Winter-odd years.
-molecular biology and physiology of nematodes

-Concepts in population and community ecology of animal- and plant-parasitic nematodes

NEM 204 Management of Plant-Parasitic Nematodes. Westerdahl. Spring-even years.
-Theory, foundation, principles, and practices of nematode management.

Others:
NEM 202 Nematodes and the Soil Environment (Winter)
NEM 205 Insect Nematology and Biological Control (Fall-even years)
NEM 225 Nematode Taxonomy (Winter-odd years)